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Maine Agricultural Experiment Station

BULLETIN No. 139. MARCH, 1907.

ORCHARD NOTES, 1906.

19

This bulletin contains a report of progress upon orchard experiments in Kennebec county, including culture and fertilization, orchard renovation, top-grafting, and cover crops; and notes upon pruning orchards.

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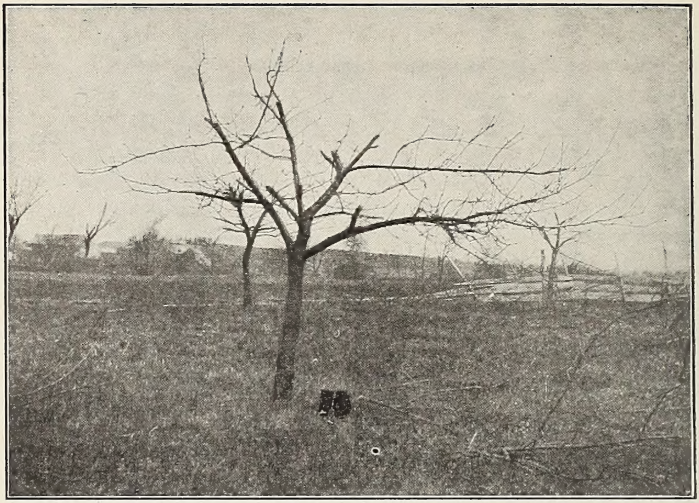

FIGURE 1. Ben Davis, 14 years old, top-worked to Jonathan, May, 1904.

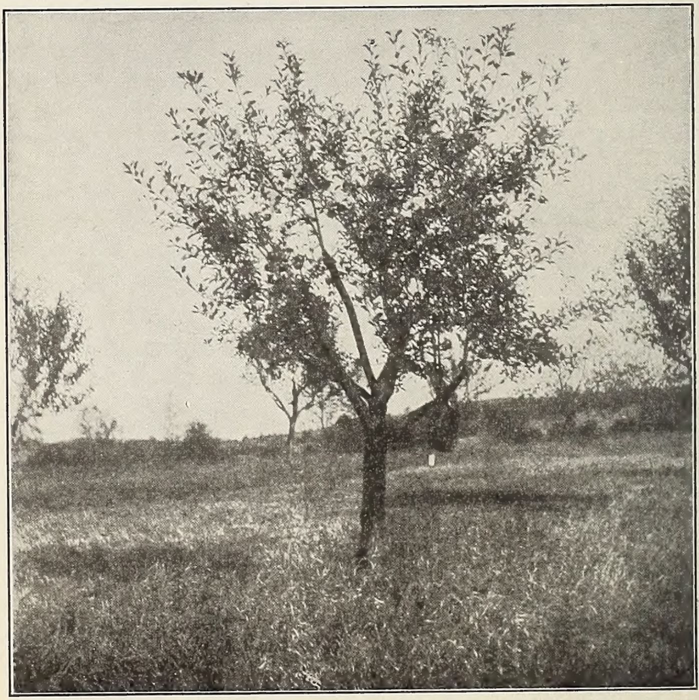

FIGURE 2. Tree shown in Figure 1, after $2\frac{1}{2}$ years, October, 1906. The tree bore one peck of fruit. (See page —.)

BULLETIN No. 139.

ORCHARD NOTES. 1906.

W. M. MUNSON.

The orchard work of the season of 1906 is a continuation of that detailed in Bulletins 89, 122, and 128, and is considered in the same general way. The season of 1906 was unusual, by reason of extreme wetness previous to August 1, followed by extreme drought after that date. Despite these conditions, however, the Baldwins never before yielded such fair, smooth, handsome fruit. The Tolmans were not quite so good, and were noticeably attacked by codling moth. In addition to the usual field work at Manchester and New Gloucester, the orchards were all thoroughly pruned this season, and some notes and suggestions relative to pruning are given herewith. A study of seedling apples native to the State has also been made, and it is planned later to publish notes and descriptions of these.

CULTURE AND FERTILIZATION.*

The comparative study of cultivation and mulch, as treatment for a young bearing orchard, showed results somewhat different in the season of 1906 from those obtained the previous season. The growth of trees was essentially the same as in previous years; but the yield of fruit was, in some cases at least, better from the mulched trees. There is less tendency to deterioration, *i. e.* there are fewer dead or dying trees, among the Gravensteins on the mulched area than on the cultivated, possibly due to the fact that growth had been less vigorous, and the wood had more nearly matured previous to the recent severe winters. Little difference was noticed in this respect in the relative effects of the use of stable manure and concentrated fertilizers.

The unfertilized trees at the end of the orchard show a decided falling off. The rotting turf, which furnished nourishment for the first few years of the experiment, has been exhausted, and the trees now have the yellow, half starved appearance too common in New England orchards. Of the 11 unfertilized trees on the cultivated section of the orchard, 7 produced fruit this year, yielding a total of 20 baskets (10 bushels); while of the 11 unfertilized mulched trees, 4 produced fruit, yielding a total of 22 baskets (11 bushels). Of the 7 cultivated trees mentioned, however, all but one produced fruit the previous year (a total of 14 bushels); while of the 4 mulched trees only one produced fruit in 1905, (a total of 2 bushels). It should further be stated that of the mulched trees mentioned more than half of the fruit (13 baskets) came from one tree, No. 49, previously noted as particularly and unaccountably thrifty and productive. The most casual observer can but note the need of additional plant food.

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* See Bulletin 122 of this Station, p. 182.

On the fertilized portion of the orchard the difference between the culture and the mulch was, this year, about as 1 to 2 1-2, with the Tolmans, but was quite the opposite with the Gravensteins, the ratio being 3.4 to 1. In other words, while the average yield of 11 Tolman trees on the cultivated section was *one bushel* per tree, the average of the corresponding number of trees on the mulched section was *one barrel* per tree. Of 14 Gravenstein trees on the cultivated area, on the other hand, the average yield was 4.8 baskets as compared with 1.4 baskets on the mulched area. As a matter of fact, the difference is even more striking than this, for of the 14 cultivated trees 10 bore fruit, the minimum crop being 2 baskets and the maximum 13; while of the mulched trees but 2 bore fruit, one giving 1 1-2 baskets, and the other 10 baskets.

In comparing the yields of both Tolmans and Gravensteins for two or three seasons past, there is an apparent advantage from the use of stable manure. This advantage, which lies partly in the added amount of humus and, doubtless, partly in an actually larger amount of plant food per tree, is not sufficient, however, to pay the extra expense of hauling the manure for the considerable distance which is necessary in this, as in most orchards. Where stable manure is readily obtainable, and need not be hauled long distances, or over rough roads, there is nothing better for use in the average Maine orchard; but in very many cases the use of concentrated fertilizers is more economical, and will give equally as good results.

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† See plan of orchard Bulletin 122, this Station, p. 183.

ORCHARD RENOVATION.*

The work in the "renovation orchard" for the season of 1906 consisted of the usual plowing and harrowing, and the application of the same amounts of fertilizers as in 1905, *i. e.* two-thirds the amount given during the first three years of the experiment; or at the rate of about 133 pounds nitrate of soda, 200 pounds of muriate of potash, and 200 pounds acid phosphate per acre, in varying combinations, on the different plots.

The effect of the treatment given this orchard is visible as far as the orchard can be seen, and from a hillside one-half mile distant the different plats can readily be distinguished by reason of difference in color and vigor of foliage. On those plats from which nitrogen has been withheld, there is now a decided lack of color and a weak growth indicative of neglect; while on the plats receiving nitrogen, whether alone or in combination, a vigorous growth and rich deep green foliage are evident. On this particular hillside, nitrogen is the one thing lacking; potash and phosphoric acid, either alone or in combination, giving no better results than are found with the check trees. The plat receiving all three elements, however, is decidedly the best in the lot, although if there is any difference in soil, this is the poorest corner of the orchard.

The data given in the tables on pages 54 and 55, continued from last year,* are suggestive. As previously noted, the winters of 1903-4, and of 1904-5, were both exceptionally severe, and many trees were badly injured. While the trees under observation are making a strong effort at recovery, and, in nearly every instance, are forming new tops where the injured portions have been cut away, there was not sufficient vitality in the trees to make this recovery and to form fruit buds in the fall of 1905 for last season's crop. Hence the apparent falling off in productiveness, as shown in column five of the tables. An examination of the trees late this fall, however, indicates every prospect for a full crop again next year.

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* See Bulletin 89 of this Station, p. 18; Bulletin 122, p. 190.

* Bulletin 122 of this Station, p. 193.

Orchard Renovation—Annual Yield.

Plat and number of tree.	Yield Per Tree, in Barrels.				Remarks.
	1903.	1904.	1905.	1906.	
Plat I. Tree No.					
11	4.5	1.0	2.8	0.0	
12	3.5	0.0	2.6	0.0	
13	3.5	3.3	2.4	0.0	
14	2.0	3.0	3.4	.2	
15	6.5	1.7	3.0	0.0	
21	3.0	2.8	1.9	1.4	
22	3.0	6.0	1.0	3.8	
23	4.0	1.6	3.2*	0.0	*Extra good fruit, 1905.
24	.5	3.0	.6	2.4	
25	8.5	4.0*	4.8*	0.8*	*Extra good fruit.
Check Row Tree No.					
31	3.5	6.1	.1	2.8	
32	5.0	3.9	2.1	2.2	
33	1.5	2.0*	2.1	0.0	*Extra good type.
34	1.5	4.2	0.0	0.0	
35	1.5	1.7*	1.5	0.0	*Extra good type.
Plat II. Tree No.					
41	....	....	....	....	Vacant.
42	3.0	8.7	....0.0	0.0	Nearly killed, winter of 1904-5, recovering.
43	0.0	2.5	0.0	1.0	
44	3.5	4.1	0.0	0.8	
45	1.0	5.4	1.2	0.0	
51	4.5	5.9*	2.4*	1.4*	*Extra good type of fruit.
52	1.0	3.4	0.0	0.0	
53	5.0	2.7*	3.3	0.0	*Extra good type.
54	.5	4.7	0.0	0.0	
55	.5	3.7	.1	0.6	
Check Row Tree No.					
61	....	1.5	0.0	1.0	
62	2.5	3.8	0.0	5.0*	*Extra good type.
63	1.0	4.5	.1	4.4	
64	1.0	6.4	0.0	0.0	
65	2.0	4.0	0.0	0.0	
Plat III. Tree No.					
71	5.5	.4	2.1	0.0	
72	6.5	.0	3.4	0.0	
73	1.5	.4	1.7	0.0	
74	1.0	1.5	.5	1.0	
75	0.0	.8	1.0	0.0	
81	6.0	2.9 †	1.5	1.9	†Nearly all the fruit on this plat dropped early, in 1904, remainder was soft and worthless as in April or May.
82	2.5	1.0	3.2	0.0	
83	3.5	1.5	2.6	0.3	
84	4.0	.9	4.8	0.0	
85	4.0	1.1	4.1	0.0	
Check Row Tree No.					
91	....	3.5	.6	0.0	
92	....	1.8	.5	0.0	
93	....	3.0	2.3	0.0	
94	....	5.4	3.6	0.0	
95	....	....	....	....	

Orchard Renovation—Annual Yield—Concluded.

Plat and number of tree.	Yield per Tree, in Barrels.				Remarks.
	1903.	1904.	1905.	1906.	
Plat IV. Tree No.					
16	1.5	1.3	1.0	0.0	
17	2.0	6.5*	.5	3.8*	*Extra good type.
18	.0	.4	.9	0.0	
19	0.0	2.5	.7	0.2	
20	7.0	5.8*	1.3	3.0*	*Extra good type.
26	.0	2.5	.1	0.0	
27	1.5	5.0	1.9	0.8	
28	.0	3.7	.4	0.0	
29	.0	5.1	2.3	0.0	
30	4.0	2.4	3.4	0.0	
Check Row Tree No					
36	....	....	....	....	Vacant.
37	.0	5.0	.2	1.6	
38	.0	2.4	1.0	0.0	
39	.0	5.8	.3	1.8	
40	.0	.4	.1	0.0	Almost dead.
Plat. V. Tree No.					
46	2.0	4.2	.0	0.0	
47	5.0	5.8	3.4	2.2*	*Extra good type.
48	.0	2.2	1.6	0.0	
49	.0	2.5	1.2	0.0	
50	.0	1.8	1.0	0.0	
56	....	....	....	....	Gravenstein.
57	.0	.0	.9	0.0	Tree broken; only one limb, extra fine fruit
58	....	....	....	....	Gravenstein.
59	....	....	....	....	Gravenstein.
60	....	....	....	....	Gravenstein.
Check Row Tree No.					
66	1.5	2.4	1.6	0.0	
67	2.0	2.3	.8	1.4	
68	2.5	1.3	.2	0.0	
69	....	....	....	....	Gravenstein.
70	....	....	....	....	Gravenstein.
Plat VI. Tree No.					
76	3.0	1.0	1.0	.2	
77	6.5	0.0	1.3	0.0	
78	.0	.0	.1	0.0	
79	....	....	....	....	Gravenstein.
80	....	....	....	....	Gravenstein.
86	3.0	.7	1.6*	0.0	*Also .8 bbl. Starkey on portion of tree.
87	4.0	.0	2.8	0.0	
88	3.5	2.8 †	3.5	1.6	†Condition of this fruit similar to that of plat 3.
89	.0	1.1	.5	0.0	
90	1.0	3.2	.9	1.1	
Check Row Tree No.					
96	....	7.0	.0	0.0	
97	....	2.6	1.0	0.2	
98	....	3.4*	2.0	0.0	*Extra good fruit.
99	....	.5	1.0	0.0	
100	....	4.2	1.1	0.0	

Another feature worthy of note is the continued exhibition of individuality of character suggested last year.* Certain trees, as is the case with certain hens in a flock, or certain cows in a herd, are more or less uniformly productive, while others are uniformly unproductive, or are erratic. Compare, for example, Numbers 17, 20, 21, 22, 25, 32, 47, 51, 67, and 81, with 16, 28, 43, 50, 52, 54, 64, 68, 73, and 78. During the four seasons since the records have been kept, the first 10 trees, representing all of the different plots, have yielded an aggregate of *131 barrels* of fruit. During the same period the second 10 trees, representing the same plots, have produced an aggregate of *39 barrels.* Continuous records of these trees will be kept, and cions from each engrafted upon a uniform foundation stock for comparison.

Most of the trees formerly designated as bearing an "extra good type" of fruit, so far as they produced fruit at all, this year, showed the same desirable characteristics. This is particularly true of numbers 17, 20, 25, and 51. Cions from these trees, also, will be made the basis of comparison with cions from less desirable types.

It is generally believed that by selecting cions from trees of productive habit and desirable type, the character of a young orchard may be correspondingly improved; but no accurate data are available to substantiate this claim. The fact of bud variation is admitted, and the results obtained by George T. Powell,† and others, point to the practice of cion selection as one of probable importance. One of the aims of the station in conducting the work here described is, if possible, to answer definitely the questions involved.

THE TOP-WORKED ORCHARD.*

While conclusions cannot yet be drawn from the work in top-grafting, it is of interest to note that all trees of Jonathan, both those from nursery stock and those from bearing trees, bore some fruit this year. The yield was not large—1-2 peck to one peck on each tree—but for trees engrafted but 2 1-2 years, the start is satisfactory. The cuts, figures 1 and 2, show the Jonathan trees as they appeared after grafting, in May, 1904, and at the time of harvest, October, 1906. None of the other varieties, Baldwin, Sutton or Spitzenburg, have yet produced fruit. The original Ben Davis trees, left for comparison, produced from 1 to 2 bushels of fruit each.

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* Bulletin 122 of this Station, pp. 194, 195.

† Trans. Maine Pom. Soc., 1899, p. 44.

* See Bulletin 122 of this Station, pp. 198, 199.

The early part of the season was so very wet that cultivation of this orchard was impossible in 1906. Accordingly neither culture nor fertilizers were applied. The witch grass, which is very abundant here, grew luxuriantly and was mown, in August, and left upon the ground. In 1907 the usual clean culture will be practiced and fertilizers at the rate of 500 pounds per acre will be applied.

COVER CROPS.†

The chief advance made in the work with cover crops during the past year, has been the practical demonstration of the value of rye and spring vetch for such purposes in a region where they had not hitherto been used. On a dry, rather steep hillside, on the farm of Mr. John W. True, in New Gloucester, stands a thrifty young Ben Davis orchard, which is just coming into full bearing. This orchard is thoroughly enriched every year, either with stable manure or with concentrated fertilizers, and besides growing some very thrifty trees, has for several years produced alternate crops of silage corn and of potatoes.

In the late summer of 1905, at the time of the last cultivation of the silage corn, this orchard was divided into 3 plats, upon the first of which spring vetch was sown at the rate of 1 1-2 bushels per acre; upon the second winter rye, at the same rate; and upon the third or check plat no cover crop was used. Owing to the shade of the growing corn, the vetch plants made but little growth and a poor stand was secured. The rye, while weak and drawn at the time the corn was cut, thickened and made a good cover before the close of the season.

On May 12 the orchard was inspected and it was found that the upper plat, upon which vetch had been sown, was but slightly protected and that gullies, in some places a foot deep, had been washed between the trees. The second plat, on which the rye was used as a cover crop, showed no tendency to form gullies, and the land was left in good condition. The line between the two plats was sharply drawn by the protecting action of the rye. Below, on the check plat, the washing commenced again, and the soil was left as in the first plat. In some cases a regular network of roots was exposed to sun and drying winds. On May 15 the whole orchard was plowed, and no ill effects consequent upon growing a spring crop upon the dry hillside followed.

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† See Bulletin 122 of this Station, p. 201-203.

While not of scientific importance, this demonstration of a principle which has so frequently been urged by the Experiment Station has done more than mere words and reports can ever do to induce practical farmers to follow the method suggested, and thus prevent alike the washing of cultivated hillsides in winter, and the drying out of the land by leaving the cover crop too late in the spring.

SPRAYING NOTES.

Owing to the unusually favorable conditions during the past few seasons, the practice of spraying orchards for insect and fungous pests has been somewhat neglected. Apple scab, formerly so destructive, has given very little trouble, and Maine has not to contend with the dreaded bitter rot of the South and West. At no time for the past 10 years, however, has the codling moth been so abundant as in 1906, and it is reasonable to expect even greater trouble next season; while a warm, moist spring is almost certain to develop a serious outbreak of apple scab.

As repeatedly shown by the publications of this Station, both the scab and the insect pests—codling moth, canker worm, bud moth, and tent caterpillars—may readily be held in check by a timely and thorough spraying with Bordeaux mixture and Paris green, or Bordeaux mixture and arsenate of lead. As a matter of insurance, therefore, wherever it is possible, every orchard should be sprayed in April, before the buds open, again just before the blossoms open, and at least once after the fruit sets. If any application is to be omitted let it not be the first one, as experience has shown that this application is specially valuable in checking apple scab, while this is also the time—and the only possible time—to fight the bud moth.

The fact of the financial gain to be derived from rational spraying is no longer in doubt. Therefore, experiments by the Station along this line are unnecessary. A circular of information, " How to Fight Apple Enemies," will be sent to anyone interested in the matter, however.

DWARF PEARS.

Owing to the natural conditions in northern New England, little attention has been given to the growing of dwarf fruits. Considerable interest is evinced in the subject, however, and inquiries concerning the merits of the dwarfs are frequently received.

The experiment station of a neighboring state is making a somewhat extended study of dwarf fruits, including apples, pears, and others, and results of these trials are awaited by the fruit growers of all New England.

For purposes of demonstration and study a small orchard of dwarf pears was planted at the Station in 1903. This orchard, consisting of 100 trees, is not yet in bearing; though some of the trees blossomed in 1906. The following varieties are included in the orchard, 5 to 10 trees of each being planted: Koonce, Angouléme, Flemish Beauty, Seckel, Manning Elizabeth, Howell, Louise Bonne of Jersey, Anjou, Lincoln, Mount Vernon. Besides these, 2 trees each of Fame, King Karl, and Triumph, have been received for trial. Most of the trees are making a vigorous growth, and give every indication of making a valuable addition to the Station's collection of fruits.

While for most commercial purposes the standard pears are usually preferred to the dwarfs, the latter are often desirable for amateur uses, or in special locations where but a small amount of land is available. Among the advantages of the dwarfs are: Small size, and consequent large number of trees that may be grown upon a given area; habit of early bearing; adaptation to unfavorable soil conditions; ease of caring for the trees and of harvesting the crop. One of the best dwarf pear orchards in the country is more than 50 years old, and the trees have been so managed that all of the fruit may still be harvested from a step ladder. The trees may be planted 8 feet apart each way, cutting out alternate rows in each direction as they begin to crowd.

As a rule, dwarf pears will come into bearing at from 3 to 5 years from planting; the check to growth, resulting from the slow growing quince roots, having the usual effect of inducing fruit production. Heavy clay soils, if well drained, will sustain the quince roots, and produce vigorous healthy trees; while on pear roots the results would often be unsatisfactory. Care must be used in planting, however, and the annual growth must be cut back at least one-half every year. The ease of managing these small trees, and of harvesting the fruit is self evident.

Despite the attractive features of the dwarfs, in very many cases only failure and disappointment will result from their use. That this failure is, in many cases, preventable, is shown by the results in the Station orchard.

The requisites to success in the management of dwarf pears may be briefly summarized as follows. (1) Set with care, on well drained soil, digging large deep holes, and setting the trees so that the point of union between the cion and the quince root is at least 4 or 5 inches below the surface of the ground, when the holes are filled. (2) Prune the tops back to mere stubs at time of setting, and each year remove at least half of the annual growth. This annual pruning may be done at any time in the late fall, winter, or early spring. (3) Cut, at least a foot below point of apparent injury, and burn *at once,* every branch that shows indications of pear blight. (4) Spray, at least 3 times during the season, with Bordeaux mixture and arsenate of lead as indicated in the circular if information, "How to Fight Apple Enemies."

PRUNING NOTES.

One of the most important characteristics of any plant is the fact that its various parts are unlike; that each branch is, in a measure, independent and capable of becoming a new individual. On this fact rests the whole philosophy of the pruning of plants.

A tree is essentially a colony of individuals. Every branch is endeavoring to do what every other branch does,—that is, to bear leaves, flowers and fruit. So every branch competes with every other branch, and there are more branches, or germs of branches—buds—than can possibly be supported upon any tree. There is, then, a struggle among the branches; all are not necessary to the life of the tree and the removal of the useless ones will serve to the improvement of the remaining ones. In other words, pruning is a necessity, and the pruning given by nature in a neglected orchard or forest is more severe than the average man would dare to attempt.

It is often urged that pruning should be commenced when the tree is planted and continued annually throughout the life of the tree. It may be a question, if a proportionate amount of time is really saved, however, or a better growth of the trees secured, by early pruning. In other words, it is doubtful whether equally good or better results may not be obtained by removing superfluous branches at 4, 5, or 6 years of age, rather than by severe pruning very early in the lifetime of the tree. This question is under consideration at the Experiment Station at the present time.

Owing to the natural balance between the foraging capacity of the plant and its superficial growth, if the root system of a tree is active and effective, the top will be correspondingly large. If a large part of the top is removed, there is at once an endeavor to restore the balance by an unusually rapid growth, and the development of a large number of dormant buds in the form of "water sprouts." Pruned trees are almost always more vigorous than unpruned ones, because the food taken up by the roots is concentrated into a smaller number of branches. Pruning must, in a measure, then, have the same effect as manuring, since the stimulating effect of the new growth must be felt in a reflex manner upon the root system also, causing a rapid extension into new foraging grounds. If, then, in combination with the stimulative pruning, the new foraging grounds reached are provided with suitable plant food for the nourishment of the trees, the best possible conditions for rapid development are provided.

A common, though erroneous, notion is that the removal of large limbs from a tree is necessarily injurious. In the practical operations of orcharding, as is well known, the removal of large limbs is frequently a necessity. A plant is largely what food supply and other environments make it. The removal of a portion of it, therefore, cannot be injurious unless the portion cut away is so great as to interfere with the nutrition of the remaining parts. The vitality of a plant is largely determined by the conditions under which it grows—the soil, the surroundings, the treatment. Other things being equal, therefore, so far as an injurious effect upon the tree is concerned, it makes little difference whether a large limb or numerous individual small limbs are removed in the process of pruning. It is always advisable, however, to paint the wounds made by the removal of large limbs, and thus exclude the spores of parasitic diseases which may cause decay and death of the tree.

It is astonishing to find how little the average orchardist thinks, when pruning his trees, of the actual problems at issue. The important effect of pruning upon the vigor of the tree has already been suggested. Pruning is also practiced to produce larger and better fruits and flowers; to keep the plant within manageable limits; to remove superfluous or injurious parts; to facilitate spraying, tillage, and harvesting; to train the plant to some desired form. One of the noticeable effects of severe pruning, and the consequent disturbed equilibrium of the plant, is the formation of water sprouts. The appearance of the water sprouts seems to be influenced more by the vigor of the plant and the amount of pruning than by the season of the year in which the pruning is done. It is probable, however, that fewer water sprouts will arise if pruning is done after midsummer, since at that time the growth of the season is completed. In any case, water sprouts may be regarded as weeds in the tree top and should usually be treated as such. In some cases, however, in old trees with long, bare limbs, a few of these sprouts may well be left as a protection to the limbs and as an aid in harvesting. In a few years these sprouts will usually develop into bearing branches,—although there is a common notion that water sprouts never bear fruit.

The tendency of plants is to grow from the uppermost buds. By pruning in one way this tendency is augmented, in another way it is checked. As a rule, in dealing with fruit trees, the latter end is desired, since the principle that "checking growth induces fruitfulness" is universally recognized. The heading in of young growths tends to develop lateral and dormant buds, or to thicken the top; so that the question of heading resolves itself into a question of personal ideals. To secure thick topped trees, heading is necessary. It has, however, the further very marked advantage of inducing the development of fruit buds near the body of the tree, rather than far out on the limbs. This, in the case of plums and other tender wooded plants, is an important consideration.

Fruit bearing is determined more by habitual performance, and by the condition of the plant, than by the kind and extent of pruning. In other words, it is to a certain extent an individual characteristic, as pointed out on page 56. Pruning, however, may be made a means of thinning the fruit, and thus improving both the size and quality of that which remains, by removing superfluous shoots upon which fruit buds are borne.

But here it is important that the operator should know the manner in which the plant bears its flower buds. Heading back the annual growth thins peaches, quinces, raspberries, blackberries, black currants, and to a certain extent red and white currants and grapes, all of which develop flower buds on the wood of the last season. With the apple, pear and plum, which produce fruit on spurs or miniature branches; on wood of more than one season's growth, older limbs must, of course, be removed in order to effect the desired thinning.

Pruning, by thinning the fruit, may have a very important, though indirect, effect in controlling the bearing year of plants. If an individual fruit spur be carefully studied it will be seen that there is usually an alternation in fruit bearing, for the reason that demands made by the fruit are so great that the fruit bud cannot develop the same year. In the bearing year the leaf bud develops to continue the spur the following year, and in the following or barren year, the fruit bud is again developed for the succeeding year. Fruit bearing on alternate years is, then, largely a question of food supply. To make a tree bear every year it is necessary either to supply more food material or to remove a portion of the fruit. The latter alternative may be accomplished by pruning.

Since in large fruits one spur usually bears one fruit, the alternate bearing of individual spurs will continue, and it will be necessary to remove all of the fruit from individual spurs, thereby allowing a portion of the spurs to bear one year and others the next. It is doubtful, however, if any amount of thinning can produce an annual bearing habit unless the trees receive other necessary good care. It is probable that the better course to pursue, in attempting to get fruit every year, is to change the bearing year of entire plants throughout the orchard and allow these to bear one year and others the next. It is not to be understood that these results will always follow, but the tendency is in the direction indicated.

The season in which pruning is done has some influence on fruit bearing, since winter pruning tends to produce wood while summer pruning does not. The healing of the wound is, however, but slightly affected by the season in which the cut is made. Theoretically, the best time to make the cut, so far as healing is concerned, is in the early part of the season, since the healing process then begins without delay. More work can be accomplished in the longer, warmer days of April and May, but many prefer to go through the orchard on the crust of a deep snow.

Too much emphasis cannot be laid upon the importance of the manner of severing limbs. The wound made by removing the limb heals best if the cut is made close to the trunk or branch. A stub two or three inches long seldom or never heals, and becomes a lodging place for spores of fungi and bacteria which cause decay and death of the tree. Wounds of any considerable size should be given a coating of paint or some other suitable substance. A suitable dressing must contain two distinct properties. It must check the weathering of the wound and prevent the growth of bacteria and fungi, and it must be of such a nature as not to injure the surrounding bark. The dressing is of no value in the healing of the wound, except that it prevents decay.

For general purposes a pure white lead paint is satisfactory. It is an antiseptic and it adheres closely to the wood. Wax, shellac, tallow, etc., are lacking in these respects. Bordeaux mixture would be an admirable material for these purposes were it more durable.